Computational Neuroscience

Students of NS/PY 357 Bates College

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Contents

1 Preface **5**

1.1 This book is free (as in pizza) 5

1.2 This book is free (as in speech) 5

1.3 This book can be revised and disseminated more rapidly than traditional textbooks 6

1.4 This book creates a public record of learning that exists after the semester ends 6

1.5 Authors: Version 0.0 6

1.6 Authors: Version 1.0 7

2 Introduction to Python **9**

2.1 Vocabulary 9

2.2 Introduction 9

2.3 Summary 9

2.4 Example Python Problems 9

2.5 Conceptual Exercises for Learning Python 9

2.6 Coding Exercises for Learning Python 9

3 What is Computational Neuroscience? **11**

3.1 Vocabulary 11

3.2 Introduction 11

3.3 What is computational neuroscience? 11

3.4 Levels of organization 11

3.5 Applications of computational neuroscience 11

3.6 The future of computational neuroscience 11
3.7 Summary 11
3.8 Exercises: 11

4 Passive Membrane Models 13
4.1 Vocabulary 13
4.2 Introduction 13
4.3 What is an action potential? 13
4.4 Nernst equilibrium potential 13
4.5 Leaky Integrate and Fire Model 13
4.6 Summary 13
4.7 Exercises 13

5 Hodgkin and Huxley Model 15
5.1 Vocabulary 15
5.2 Introduction 15
5.3 The Hodgkin and Huxley model 15
5.4 Summary 15
5.5 Exercises: 15

6 Firing Rates 17
6.1 Vocabulary 17
6.2 Introduction 17
6.3 Spike Trains 17
6.4 Spike Statistics 17
6.5 Summary 17
6.6 Exercises 17

7 Reverse Correlation and Receptive Field Mapping 19
7.1 Vocabulary 19
7.2 Introduction 19
7.3 Spike-triggered Average 19
7.4 Reverse Correlation 19

7.5 Summary 19
7.6 Exercises 19

8 Decoding **21**
8.1 Vocabulary 22
8.2 Introduction 22
8.3 Imaging Techniques 22
8.4 Introduction to Decoding 22
8.5 What is a classifier? 22
8.6 Cross validation 22
8.7 Conclusion 22

9 Neural Networks **23**
9.1 Vocabulary List: 23
9.2 Introduction/Background 23
9.3 Different Types of Learning 23
9.4 McCulloch-Pitt (MCP) Neurons 23
9.5 Perceptron 23
9.6 Summary 23

10 Glossary **25**

11 References **27**
11.1 Chapter 1: Preface 27
11.2 Chapter 2: Introduction to Python 27
11.3 Chapter 3: What is Computational Neuroscience? 27
11.4 Chapter 4: Passive Membrane Models 27
11.5 Chapter 5: Hodgkin and Huxley 27
11.6 Chapter 6: Firing Rates 27
11.7 Chapter 7: Reverse Correlation and Receptive Field Mapping . . 27
11.8 Chapter 8: Decoding 27
11.9 Chapter 9: Neural Networks 27

12 Answers to Exercises **29**

12.1 Chapter 1: Introduction to Python 30

12.2 Chapter 2: Introduction to Computational Neuroscience 30

12.3 Chapter 3: Passive Membrane Models 30

12.4 Chapter 4: Hodgkin and Huxley 30

12.5 Chapter 5: Firing Rates 30

12.6 Chapter 6: Reverse Correlation and Receptive Field Mapping . . 30

12.7 Chapter 7: Decoding 30

12.8 Chapter 8: Neural Networks 30

Chapter 1

Preface

What you are about to read is an open textbook written for (and by) students of Computational Neuroscience at Bates College. This is version 1.0 of a living document that will be revised, reused, and appended over the course of many generations of this course. As the instructor of this course, I want to briefly outline *my* motivations for undertaking this project in hopes that this idea may spread.

1.1 This book is free (as in pizza)

It is broadly accepted that college affordability is a key challenge for the U.S. in the 21st century. One of the drivers of increased college cost is the increased cost of course textbooks. Over the past 40 years, textbook prices have risen over 1200% over the last 40 years – much higher than the rate of inflation, and higher even than housing or healthcare! By creating a free textbook, we are broadening the participation of students in computational neuroscience.

While this was true when we began this project in 2019, it is even more true as we face a global pandemic and recession in 2020. I am very happy to be opening up knowledge on this topic as the world seems more closed. As the class reflected on their work, a number of additional novel reasons for this project emerged: reducing the environmental impact of creating and shipping paper textbooks, and the health implications of sharing physical textbooks during a pandemic.

1.2 This book is free (as in speech)

As important as cost-free textbooks is, equally important are the freedoms that openness provides. We are opening this resource for reuse, revision, and redis-

tribution. We welcome others to remix into other works. It is my belief that the availability of high-quality resources allows for creativity and innovation to spring up in others. My teaching and scholarship has benefited greatly from openly available sources, and I feel that my success as an academic is to pay this forward.

1.3 This book can be revised and disseminated more rapidly than traditional textbooks

Part of the impetus of this book came from a frustration in finding a traditional textbook that was appropriate for my undergraduate, 300-level course in computational neuroscience. Many of the books, though excellent, assumed a graduate-level sophistication in mathematics. Nearly all were missing some of the most modern topics. Computational neuroscience is a rapidly-evolving field, so an open textbook allows for more rapid editing, addition, and dissemination than is afforded by a traditional publishing model.

1.4 This book creates a public record of learning that exists after the semester ends

Part of the educational journey is making the leap between being a *consumer* of knowledge to being a *generator* of knowledge. It is oft-said but nonetheless true statement that one truly learns by teaching. This assignment places students in the role of teacher, making the content come alive by explaining it in their own words. All too often, the writing that we do in college is in the form of the "disposable assignment" - one that students will spend a few hours working on, that I will spend a few hours reading and grading, and then is thrown away. Writing an open textbook is more of a renewable assignment - one that will have value in the world long after the semester is over.

We hope that you enjoy this book. Please feel free to reach out to me if you have any questions or comments about our work: mgreene2@bates.edu.

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Chapter 2

Introduction to Python

Placeholder

2.1 Vocabulary

2.2 Introduction

2.3 Summary

2.4 Example Python Problems

2.5 Conceptual Exercises for Learning Python

2.6 Coding Exercises for Learning Python

Chapter 3

What is Computational Neuroscience?

Placeholder

3.1 Vocabulary

3.2 Introduction

3.3 What is computational neuroscience?

3.4 Levels of organization

3.5 Applications of computational neuroscience

3.6 The future of computational neuroscience

3.7 Summary

3.8 Exercises:

Chapter 4

Passive Membrane Models

Placeholder

4.1 Vocabulary

4.2 Introduction

4.3 What is an action potential?

4.4 Nernst equilibrium potential

4.5 Leaky Integrate and Fire Model

4.6 Summary

4.7 Exercises

4.7.1 Conceptual Exercises

4.7.2 Coding Exercises

Chapter 5

Hodgkin and Huxley Model

Placeholder

5.1 Vocabulary

5.2 Introduction

5.3 The Hodgkin and Huxley model

5.4 Summary

5.5 Exercises:

5.5.1 Conceptual Exercises:

5.5.2 Coding Exercises:

Chapter 6

Firing Rates

Placeholder

6.1 Vocabulary

6.2 Introduction

6.3 Spike Trains

6.4 Spike Statistics

6.5 Summary

6.6 Exercises

6.6.1 Conceptual Problems

6.6.2 Coding Problems

Chapter 7

Reverse Correlation and Receptive Field Mapping

Placeholder

7.1 Vocabulary

7.2 Introduction

7.3 Spike-triggered Average

7.4 Reverse Correlation

7.5 Summary

7.6 Exercises

7.6.1 Conceptual Exercises

7.6.2 Coding Exercises

Chapter 8

Decoding

Placeholder

8.1 Vocabulary

8.2 Introduction

8.3 Imaging Techniques

8.3.1 EEG

8.3.2 MEG

8.3.3 fMRI

8.3.4 ECOG

8.4 Introduction to Decoding

8.5 What is a classifier?

8.5.1 Correlation classifiers

8.5.2 Distance-based classifiers

8.5.3 Boundary-based classifiers

8.6 Cross validation

8.7 Conclusion

Chapter 9

Neural Networks

Placeholder

9.1 Vocabulary List:

9.2 Introduction/Background

9.3 Different Types of Learning

9.4 McCulloch-Pitt (MCP) Neurons

9.5 Perceptron

9.6 Summary

Chapter 10

Glossary

Placeholder

Chapter 11

References

Placeholder

11.1 Chapter 1: Preface

11.2 Chapter 2: Introduction to Python

11.3 Chapter 3: What is Computational Neuroscience?

11.4 Chapter 4: Passive Membrane Models

11.5 Chapter 5: Hodgkin and Huxley

11.6 Chapter 6: Firing Rates

11.7 Chapter 7: Reverse Correlation and Receptive Field Mapping

11.8 Chapter 8: Decoding

11.9 Chapter 9: Neural Networks

Chapter 12

Answers to Exercises

Placeholder

12.1 Chapter 1: Introduction to Python

12.2 Chapter 2: Introduction to Computational Neuroscience

12.3 Chapter 3: Passive Membrane Models

12.3.1 Conceptual Questions

12.3.2 Coding Questions

12.4 Chapter 4: Hodgkin and Huxley

12.4.1 Conceptual Questions:

12.4.2 Coding Questions:

12.5 Chapter 5: Firing Rates

12.5.1 Conceptual Questions

12.5.2 Coding Questions

12.6 Chapter 6: Reverse Correlation and Receptive Field Mapping

12.6.1 Conceptual Questions

12.6.2 Coding Questions

12.7 Chapter 7: Decoding

12.8 Chapter 8: Neural Networks